

REMARKS

By this Amendment, Claims 1-10, 12, 13, and 20-23 have been canceled; Claims 11, 14, 15, 17, and 18 have been amended; and new Claims 24-36 have been added, leaving Claims 11, 14-19, and 24-36 pending. In paragraph number [0021] of the specification, the term "actinide series" has been changed to "lanthanide series" to correctly identify the series of the Periodic Table that includes elements having an atomic number of 58 to 71. These same elements are also referred to by those skilled in the art as the "rare earth metals." No new matter has been added by this amendment. Reconsideration of the June 5, 2003, Official Action is respectfully requested.

1. Restriction Requirement

Withdrawn Claims 1-10 and 20-23 have been canceled.

2. Rejection of Claims 11, 12, 16, 18, and 19 under 35 U.S.C. §102

Claims 11, 12, 16, 18, and 19 stand rejected under 35 U.S.C. §102(b) over JP 10004083 ("JP '083"). The reasons for the rejection are stated at numbered section 3, on page 2 of the Official Action. The rejection is respectfully traversed.

Claim 11 has been amended to include the features recited in original Claims 12 and 13 (now canceled). Claim 11, as amended, recites *inter alia* "a component of semiconductor processing equipment, the component comprising *an aluminum substrate and a ceramic layer of cerium oxide containing ceramic material on the substrate and forming an outermost surface of the component*" (Emphasis added.) As Claim 13 was not rejected under this ground of rejection, the rejection of Claim 11 is moot.

Claims 16 and 19 depend from Claim 11; accordingly, the rejection of these claims also is moot.

Claim 18 has been rewritten in independent form to include the combinations of features recited in original Claims 11 and 18, and the feature of "(a) the component is a bulk part consisting essentially of the cerium oxide containing ceramic material or (b) the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate." According to an English-language translation, JP '083 discloses an anticorrosive material for semiconductor fabrication, and that a part of a product "is made from a compd. thin film or single crystal," and the compound is an oxide, nitride, carbide or fluoride of 3a elements of the periodic table, e.g. Sc, La, Ce, Eu and Dy. JP '083 fails to disclose or suggest the combination of features recited in Claim 18, which includes the feature of "(a) the component is a bulk part consisting essentially of the cerium oxide containing ceramic material or (b) the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate." Accordingly, Claim 18 also is patentable over JP '083.

Withdrawal of the rejection is respectfully requested.

3. Rejection of Claims 11, 12, 18, and 19 under 35 U.S.C. §102

Claims 11, 12, 18, and 19 stand rejected under 35 U.S.C. §102(b) over U.S. Patent No. 5,668,072 to Holcombe Jr. et al. ("Holcombe"). The reasons for the rejection are stated at numbered section 4, on page 2 of the Official Action. The rejection is respectfully traversed.

Claim 13 was not rejected under this ground of rejection. Accordingly, the rejection of Claim 11 is moot.

Claim 19 depends from Claim 11; accordingly, the rejection of this claim also is moot.

Regarding Claim 18, the Official Action asserts that "Holcombe et al disclose Cerium oxide coating of both types on the inside of a heat treatment furnace" However, Holcombe's furnace is *not* a component of semiconductor processing equipment, much less a plasma chamber wall, a chamber liner, a gas distribution plate, a gas ring, a pedestal, a dielectric window, an electrostatic chuck, or a focus ring, as recited in Claim 18. Accordingly, Claim 18 also is patentable over Holcombe. Withdrawal of the rejection is respectfully requested.

4. Rejection of Claims 11-15 and 19 under 35 U.S.C. §103

Claims 11-15 and 19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,362,335 to Rungta. The reasons for the rejection are stated at numbered section 6, on page 3 of the Official Action. The rejection is respectfully traversed.

The Official Action asserts that "Ravi Rungta discloses corrosion-resistant barrier coating of cerium oxide on aluminum alloy and teaches that the corrosion resistance is superior to that of aluminum oxide" The Official Action acknowledges that Rungta does not expressly disclose that the coated part is to be used in an apparatus for semiconductor manufacturing, but asserts that it would have been obvious "to have a

cerium oxide coating on the inside of the chamber to have better anti corrosion than even that of anodized aluminum." Applicants respectfully disagree with these assertions.

Claim 11 recites "a component of semiconductor processing equipment, the component comprising an aluminum substrate and a ceramic layer of cerium oxide containing ceramic material on the substrate and forming an outermost surface of the component, wherein *the cerium oxide containing ceramic material (a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series*" (emphasis added). Support for the italicized features recited in Claim 11 is provided, for example, in paragraph [0021] of the specification.

Rungta discloses a method of applying a coating on an aluminum alloy. The coating comprises an aluminum oxide film into which a cerium oxide coating is incorporated by a chemical reaction process (col. 5, line 58 to col. 6, line 2). Rungta discloses that a *mixed barrier layer*, i.e., a layer containing *both* aluminum oxide and cerium oxide is formed on the aluminum alloy. Rungta fails to disclose or suggest a component comprising "an aluminum substrate and a ceramic layer of cerium oxide containing ceramic material on the substrate and forming an outermost surface of the component, wherein *the cerium oxide containing ceramic material (a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series*" (emphasis added). Accordingly, the subject matter recited in Claim 11 is patentable over Rungta.

Claims 14 and 15 have been amended to depend from Claim 11, and Claim 19 depends from Claim 11. Accordingly, Claims 14, 15, and 19 also are allowable over Rungta for at least the same reasons that Claim 11 is allowable.

Withdrawal of the rejection is respectfully requested.

5. Rejection of Claims 11-19 under 35 U.S.C. §103

Claims 11-19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,447,636 to Qian et al. ("Qian"). The reasons for the rejection are stated at numbered section 7, on page 4 of the Official Action. The rejection is respectfully traversed.

The Official Action asserts that "Qian et al disclose parts of a plasma process chamber for semiconductor manufacturing made of ceramic like aluminum oxide combined with an oxide of Group IIIB metal like cerium ... It is obvious that the combination could be either a coating or a bulk part of ceramic containing Group IIIB metal oxide like cerium as a part of it." Applicants respectfully disagree with these assertions.

Qian discloses a plasma reactor including a dome or top 103. See, for example, FIG. 1. At col. 6, lines 5-53, Qian discloses that the top 103 is mainly a ceramic component. According to Qian, the ceramic compound may be any suitable ceramic material, preferably one that may combine with an oxide of Group IIIB metal to form a ceramic structure. The IIIB metal can be one of scandium, yttrium, the cerium subgroup, the yttrium subgroup, and mixtures thereof (col. 6, lines 43-45). Qian discloses that in a preferred embodiment the preferred oxide is Y_2O_3 (col. 6, lines 51-53). However, Qian does not disclose the relative amounts of the components of the ceramic compound. Thus,

Qian does not disclose or suggest the combination of features recited in Claim 11, which includes "a ceramic layer of cerium oxide containing ceramic material ..., wherein *the cerium oxide containing ceramic material (a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series*" (emphasis added), as recited in Claim 11. Therefore, Claim 11 is patentable over Qian.

Dependent Claims 13-16, and 19 are also patentable over Qian for at least the same reasons that Claim 11 is patentable.

Claim 17 recites "a component of semiconductor processing equipment, the component comprising a bulk part consisting essentially of a cerium oxide containing ceramic material, ... the cerium oxide containing ceramic material comprising one or more cerium oxides *as the single largest constituent thereof*" (emphasis added). Qian also does not disclose or suggest the component recited in Claim 17.

Claim 18 recites "a component of semiconductor processing equipment, the component comprising a cerium oxide containing ceramic material forming an outermost surface of the component, ... the cerium oxide containing ceramic material comprising one or more cerium oxides *as the single largest constituent thereof*" (Emphasis added.) Qian also does not disclose or suggest the component recited in Claim 18.

Withdrawal of the rejection is respectfully requested.

6. Rejection of Claims 11 and 16-19 under 35 U.S.C. §103

Claims 11 and 16-19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,383,964 to Nakahara et al. ("Nakahara"). The reasons for the rejection are stated at numbered section 8, on page 4 of the Official Action. The rejection is respectfully traversed.

The Official Action asserts that "Nakahara et al disclose corrosion resistant ceramic member for a plasma chamber for semiconductor manufacturing containing cerium oxide Therefore it would have been obvious for one of ordinary skill in the art at the time [the] invention was made to have a cerium oxide coating or cerium oxide as a component of the ceramic." Applicants respectfully disagree with these assertions.

Claim 13 was not rejected under this ground of rejection. Accordingly, the rejection of Claim 11 over Nakahara is moot. The rejection of dependent Claims 16 and 19 is also moot.

Nakahara discloses a ceramic member that contains a phase of YAG of not less than 10% by volume, and a phase of yttrium oxide as the main balance. Nakahara discloses that zirconia or cerium oxide may be added (see col. 3, lines 13-42). However, Nakahara discloses that the cerium oxide content should *not* be larger than 1.0% by weight or cerium aluminate particles form, and these particles can fall off of the material surface during halogen plasma processing, generating pores on the surface, which accelerate corrosion in the plasma (see col. 8, lines 30-41). Thus, Nakahara teaches away from the combination of features recited in Claim 17, which includes a "component comprising a bulk part

consisting essentially of a cerium oxide containing ceramic material, ... the cerium oxide containing ceramic material comprising one or more cerium oxides *as the single largest constituent thereof*" (emphasis added). Thus, Claim 17 is patentable over Nakahara.

Nakahara also fails to disclose or suggest the component recited in Claim 18 for reasons stated for Claim 17. Thus, Claim 18 also is patentable over Nakahara.

Withdrawal of the rejection is respectfully requested.

7. Rejection of Claims 11-19 under 35 U.S.C. §103

Claims 11-19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,123,791 to Han et al. ("Han"). The reasons for the rejection are stated at numbered section 7, on pages 4-5 of the Official Action. The rejection is respectfully traversed.

The Official Action asserts that "Han et al disclose Cerium oxide coating of process kit of aluminum oxide ceramic for a plasma chamber ... Therefore it would have been obvious for one of ordinary skill in the art at the time [the] invention was made to have a cerium oxide coating or cerium oxide as a component of the ceramic." Applicants respectfully submit that Han does not disclose or suggest the subject matter recited in Claims 11 and 14-19.

Han discloses ceramic compositions for a process kit and a dielectric window of a reactor chamber. The compositions includes a ceramic compound and an oxide of a Group IIIB metal. The ceramic compound is preferably aluminum oxide (see col. 4, line 62 to col. 5, line 8; and col. 5, lines 27-30). Preferred Group III metals are disclosed at col. 5, lines 51-62. Cerium is disclosed as but one member of a large group of Group IIIB metals.

At col. 6, lines 15-37, Han discloses compositions of the ceramic compound of powdered raw mixtures used to make the dielectric member and process kit. Particularly, Han discloses that the ceramic compound (a) preferably comprises from about 10% by weight to about 85% by weight of the ceramic compound, from about 3% by weight to about 60% by weight of the oxide of a Group IIIB metal, from about 0.1% by weight to about 6% by weight of the suitable additive agent, and from about 5% by weight to about 35% by weight of the suitable binder agent; (b) more preferably comprises from about 5% by weight to about 55% by weight of the oxide of the Group IIIB metal; and (c) most preferably from about 10% by weight to about 50% by weight of the oxide of the Group IIIB metal. In addition, Han does not disclose or suggest that the ceramic compound is a *ceramic layer*.

Regarding Claim 11, Han fails to disclose or suggest a component of semiconductor processing equipment, which comprises the features of "a *ceramic layer* of cerium oxide containing ceramic material on the substrate ..., wherein *the cerium oxide containing ceramic material(a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series*" (emphasis added). Accordingly, the subject matter recited in Claim 11 is patentable over Han.

Dependent Claims 14-16, and 19 also are patentable over Han for at least the same reasons that Claim 11 is patentable.

Regarding Claim 17, Han fails to disclose or suggest "a component of semiconductor processing equipment, the component comprising a bulk part consisting

essentially of a cerium oxide containing ceramic material, ... the cerium oxide containing ceramic material comprising one or more cerium oxides *as the single largest constituent thereof*" (emphasis added). Accordingly, Claim 17 also is patentable over Han.

Regarding Claim 18, Han fails to disclose or suggest "a component of semiconductor processing equipment, the component comprising a cerium oxide containing ceramic material forming an outermost surface of the component, ... the cerium oxide containing ceramic material comprising one or more cerium oxides *as the single largest constituent thereof*" (Emphasis added.) Accordingly, Claim 18 also is patentable over Han.

Withdrawal of the rejection is respectfully requested.

8. Rejection of Claims 11, 12, 15, and 19 under 35 U.S.C. §103

Claims 11, 12, 15, and 19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,721,057 to Bamberg et al. ("Bamberg"). The reasons for the rejection are stated at numbered section 6 of the Official Action.

Claim 13 was not rejected under this ground of rejection; accordingly, the rejection of Claim 11 over Bamberg is moot. The rejection of dependent Claims 15 and 19 is also moot.

Withdrawal of the rejection is respectfully requested.

9. New Claims

New Claim 24 depends from Claim 11; new Claims 25 and 26 depend from Claim 17; and new Claims 27-36 depend from Claim 18. Support for the subject matter recited in

Claims 35 and 36 is provided in paragraph [0043] of the specification. Claims 24-36 also are patentable based on their dependency from Claims 11, 17 and 18.

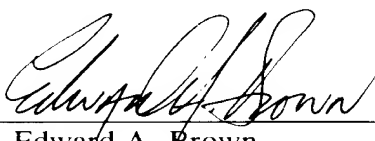
10. Conclusion

For the foregoing reasons, it is submitted that the application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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